

Lockheed Martin Corporation  
Corporate Environment, Safety & Health  
West Coast Projects Office  
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**LOCKHEED MARTIN**



Via Courier  
RED0400/044  
WBS #48

April 27, 2000

Mr. Gerard J. Thibeault  
Executive Officer  
California Regional Water Quality Control Board  
Santa Ana Region  
3737 Main Street, Suite 500  
Riverside, California 92501-3339


Dear Mr. Thibeault:

**Subject: February 2000 Data Report  
Water Supply Contingency Plan  
Production Well Sampling Program  
Crafton-Redlands Plume Project**

In compliance with the approved Water Supply Contingency Plan, enclosed please find one copy of the **February 2000 Production Well Sampling Program** report prepared by HSI Geotrans for Lockheed Martin Corporation. This report presents analytical results from samples collected at Bunker Hill Basin Production Wells in February of 2000. Laboratory Quality Assurance/Quality Control documentation is included in Attachment B of the report.

Should you have any comments or requests, please contact me at (818) 847-0791.

Sincerely,

  
for: Thomas D. Blackman  
Technical Project Manager

TDB:eah:mg

Enclosures

cc: See Attached Distribution List

Mr. Gerard Thibeault  
April 27, 2000  
RED0400/044  
Page 2

**Distribution**

cc: (Abbreviated Report Without Attachments "A & B" Which are Available Upon Request)

Kim Alexander, Psomas Engineering  
Chris Bahnsen, San Bernardino Valley Water Conservation District  
Kalyanpur Baliga, Department of Health Services (San Bernardino)  
Tom Crowley, San Bernardino Valley Water Conservation District  
Henry Dennis, Mountain View Power Co.  
Dodie Farmer, Victoria Farms Mutual Water Company  
Douglas Headrick, City of Redlands  
Ross Lewis, Gage Canal Company  
-Kevin Mayer, US EPA (Region IX)  
Steve Mains, Western Municipal Water District  
Morris Matson, Loma Linda University  
Eugene McMeans, Riverside Highland Water Company  
Zahra Panahi, City of Riverside  
Dan Randall, City of Riverside  
Bob Reiter, San Bernardino Valley Municipal Water District  
Toby Roy, Department of Health Services (San Diego)  
Jon Satrom, USAF, Norton Air Force Base  
Alain Sharp, Earth Technology Corporation  
Greg Snyder, City of Loma Linda  
Joseph Stejskal, City of San Bernardino  
Dieter Wirtzfeld, City of Riverside



# HSI GEOTRANS

A TETRA TECH COMPANY

3150 Bristol Street  
Suite 500  
Costa Mesa, California  
92626

714-513-1415 FAX 714-513-1278

April 28, 2000

Lockheed Martin Corporation  
West Coast Project Office  
2550 N. Hollywood Way, 3<sup>rd</sup> Floor  
Burbank, California 91505

Attention: Mr. Eric Hodder  
Project Coordinator

Subject: February 2000 Data Report  
Water Supply Contingency Plan  
Production Well Sampling Program  
Crafton-Redlands Plume Project

Dear Mr. Hodder:

This report presents a summary of results of the Water Supply Contingency Plan production well sampling for the month of February 2000. The Water Supply Contingency Plan (WSCP) was prepared by Lockheed Martin Corporation and submitted to the State of California Regional Water Quality Control Board (RWQCB) Santa Ana Region on September 30, 1996. The plan was conditionally approved by the RWQCB in a letter dated March 6, 1997. The WSCP for the Crafton-Redlands Plume was prepared to address maintenance of water supply to purveyors in the event that wells became impacted with trichloroethene (TCE) from the Crafton-Redlands TCE Plume. A summary of key dates and WSCP sampling program evolution is provided on Table 1.

The locations of the WSCP wells and analytical results for the February 2000 sampling event for TCE and perchlorate are shown on Figures 1 and 2, respectively. Table 2 presents a summary of analytical tests performed on each WSCP well and water system sampling point. The sampling frequency of each well is once a month for the first year. An alternate frequency, if required, is based on the analytical results as outlined in the WSCP TCE and perchlorate decision matrices, provided as Figures 3 and 4, respectively. The perchlorate decision matrix was presented in the *Perchlorate Work Plan and Schedule*, which was submitted, to the RWQCB on August 15, 1997. The RWQCB approved the

Perchlorate Work Plan on October 31, 1997. Table 3 presents a summary of the wells sampled twice monthly according to the decision matrices.

## **RESULTS**

A summary of the analytical results for the February 2000 WSCP sampling event for TCE and perchlorate is shown on Figures 1 and 2, respectively, and presented on Table 4. Available groundwater elevation data is provided on Table 5. The water sampling field forms are provided in Attachment A. Chain-of-custody, laboratory data sheets, and Level III Modified laboratory quality assurance/quality control (QA/QC) documentation is provided in Attachment B.

### ***Trichloroethene***

Two groundwater samples collected in February met or exceeded 2/5<sup>th</sup> the MCL for TCE (2.0 µg/L) including: COLL Mountain View #2 (3.2 µg/L), and COLL Richardson #1 (2.5 µg/L). Water from COLL Mountain View #2 and COLL Richardson #1 was not pumped into the system and therefore a confirmation sample was not collected.

The TCE observed at Gage 29-2 and Gage 29-3 is partially attributed to the Norton AFB plume and partially attributed to the Crafton Redlands plume, thus Gage 29-2 and Gage 29-3 are sampled twice a month for TCE when active. In February, Gage 29-2 and Gage 29-3 were off-line and not sampled.

The COLL Richardson Blend sampling point was not sampled in February because during the month of February, only the Richardson #3 well was pumping into the Richardson system. Thus, sampling of Richardson Blend was considered redundant.

### ***Perchlorate***

Groundwater samples collected from two wells in February met or exceeded 75 percent (13.5 µg/L) of the PAL for perchlorate including: COLL Mountain View #2 (44 µg/L), and COLL Richardson #1 (33 µg/L). Water from COLL Mountain View #2 and COLL Richardson #1 was not pumped into the system and therefore confirmation samples were not collected.

Gage 29-2, Gage 29-3, Gage 51-1, Gage 92-1 and COLL Mountain View #2 wells are currently scheduled for sampling on a twice a month basis for perchlorate, if active. Gage 29-2, Gage 29-3, Gage 51-1, and Gage 92-1 were off-line in February and thus were not sampled.

The perchlorate impacts observed at COLL Mountain View #2 are consistent with historic data when the well has been idle and sampled shortly after the pump has turned on. The perchlorate impacts observed at Richardson #1 are a result of cross-flow between hydrostratigraphic units through Richardson #2. The Richardson #2 well was abandoned (San Bernardino County permitted well destruction) in February 2000.

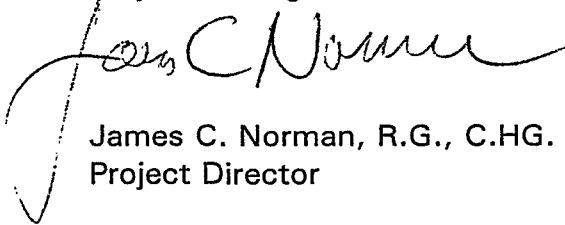
***CLOSING***

HSI GeoTrans greatly appreciates being of continued service to Lockheed Martin Corporation on this project. Should you have any questions or comments, please do not hesitate to call.

Sincerely,  
**HSI GEOTRANS**



Roy J. Marroquin  
Project Manager



James C. Norman, R.G., C.HG.  
Project Director

TABLES

**TABLE 1**

**KEY PROJECT DATES AND WSCP SAMPLING PROGRAM EVOLUTION**

August 2, 1996, the RWQCB – Santa Ana Region requested Lockheed Martin to submit a conceptual Water Supply Contingency Plan.
September 30, 1996, Lockheed Martin submitted the Water Supply Contingency Plan (WSCP) to the RWQCB – Santa Ana Region.
March 6, 1997, the RWQCB conditionally approved the WSCP, which included sampling eight production wells (City of Loma Linda Richardson #1, Richardson #2, Mountain View #1, Mountain View #2, Victoria Farms Mutual Water Company Wells #1 and #3, and Southern California Edison #1 and #2).
June 1997, Victoria Farms Mutual Water Company was connected to City of San Bernardino Water. Pumping ceased at VFMWC #1 and #3, and the two wells were removed from the program.
June 1997, sampling of SCE #1 was discontinued because it is not operated on a regular basis. The WSCP consists of five wells, including COLL Mountain View #1 and #2, COLL Richardson #1 and #2, and SCE #2 (AUX).
August 1997, the WSCP was expanded due to the detection of perchlorate in municipal supply wells in the Bunker Hill Basin. Twenty-six wells were added to the WSCP including nineteen City of Riverside wells, five City of Redlands wells, and two Loma Linda University wells, for a total of 31 wells.
October 1997, three City of Riverside water system sampling points were added to the WSCP, including the Gage system pipeline (Gage Delivery), the Waterman system pipeline (Iowa Booster), and the sampling station measuring outflow from the Linden and Evans Reservoirs (7 <sup>th</sup> & Chicago).
March 1998, two City of Loma Linda water system sampling points were added to the WSCP, including the Mountain View system pipeline (Mountain View Blend at Lawton) and the Richardson system pipeline (Richardson Blend).
June 1998, one City of Riverside irrigation water system sampling point (Gage Arlington) and one additional City of Loma Linda water system sampling point (Mountain View Blend at Timoteo) were added to the WSCP.
December 1998, the COLL Richardson #3 well was added to the WSCP Sampling Program.
May 1999, Sampling of Mountain View Blend at Timoteo was discontinued because it does not represent a blend sample of the Mountain View pipeline system.
December 1999, the COLL Mountain View #3 well and the Gage 98-1 well were added to the WSCP Sampling Program.

TABLE 2

## WSCP PRODUCTION WELL SAMPLING PROGRAM

HSI#	Well Name	Perchlorate	TCE
City of Loma Linda			
692	Mountain View #2	X	X
3106	Mountain View #3	X	X
693	Richardson #1	X	X
694	Richardson #2	X	X
707	Richardson #3	X	X
City of Loma Linda Water System Sampling Points			
2967	Mountain View Blend - Lawton	X	X
2968	Richardson Blend	X	X
Southern California Edison			
554	SCE#2(AUX)	X	X
Loma Linda University			
267	LLUniv Anderson #2	X	
717	LLUniv Anderson #3	X	
City of Riverside (Gage System)			
252	Gage#26-1	X	X
258	Gage#27-1	X	X
259	Gage#27-2	X	X
260	Gage#29-1	X	X
219	Gage#29-2	X	X
220	Gage#29-3	X	X
218	Gage#30-1	X	X
214	Gage#31-1	X	X
215	Gage#46-1	X	X
253	Gage#51-1	X	X
216	Gage#56-1	X	X
257	Gage#66-1	X	X
644	Gage#92-1	X	X
641	Gage#92-2	X	X
642	Gage#92-3	X	X
3091	Gage#98-1	X	X
City of Riverside (Waterman System)			
273	Hunt#6	X	
271	Hunt#10	X	
272	Hunt#11	X	
City of Riverside Water System Sampling Points			
2946	Iowa Booster (Waterman)	X	X
2947	Gage Delivery (Gage)	X	X
2948	7th & Chicago (Reservoir)	X	X
3018	Gage Arlington	X	
City of Redlands			
542	COR Church St	X	
2673	COR#38	X	
535	COR Mentone Acres	X	
29	COR Orange st	X	
74	CORRees	X	X

## Notes:

TCE = Trichloroethene

Perchlorate analyzed using DHS Method (EPA 300.0 Modified)

TCE analyzed using EPA Method 502.2

TABLE 3

**WSCP PRODUCTION WELL SAMPLING PROGRAM  
FEBRUARY 2000 WELLS SAMPLED TWICE MONTHLY**

HSI#	Well Name	Perchlorate	TCE
City of Loma Linda			
692	Mountain View #2	X	
City of Riverside (Gage System)			
219	Gage #29-2	X	X
220	Gage #29-3	X	X
253	Gage #51-1	X	
644	Gage #92-1	X	

**Notes:**

TCE = Trichloroethene

Perchlorate analyzed using DHS Method (EPA 300.0 Modified).

TCE analyzed using EPA Method 502.2.

**TABLE 4**  
**WSCP PRODUCTION WELL SAMPLING PROGRAM**  
**FEBRUARY 2000 DATA RESULTS**

HSI#	Well Name	Sample Date	Perchlorate (µg/L) Del Mar	TCE (µg/L) Del Mar
<b>City of Loma Linda</b>				
692	Mountain View #2	2/1/00	44 <sup>c</sup>	3.2 <sup>c</sup>
692	Mountain View #2*	2/15/00	46 <sup>c</sup>	3.0 <sup>c</sup>
3106	Mountain View #3	2/1/00	ND(4)	ND(0.5)
3106	MUN-769	2/1/00	ND(4)	ND(0.5)
693	Richardson #1	2/1/00	33 <sup>cd</sup>	2.5 <sup>cd</sup>
694	Richardson #2	NS	NS	NS
707	Richardson #3	2/1/00	ND(4)	ND(0.5)
<b>City of Loma Linda Water System Sampling Points</b>				
2967	Mountain View Blend-Lawton	2/1/00	ND(4)	ND(0.5)
2968	Richardson Blend	NS	NS	NS
<b>Mountain View Power (Formerly Southern California Edison)</b>				
554	SCE#2(AUX)	2/1/00	ND(4)	ND(0.5)
<b>Loma Linda University</b>				
267	LLUniv Anderson #2	2/1/00	ND(4)	NA
717	LLUniv Anderson #3	2/1/00	ND(4)	NA
<b>City of Riverside (Gage System)</b>				
252	Gage#26-1 <sup>b</sup>	NS	NS	NS
258	Gage#27-1 <sup>b</sup>	NS	NS	NS
259	Gage#27-2	NS	NS	NS
260	Gage#29-1	NS	NS	NS
219	Gage#29-2	NS	NS	NS
219	Gage 29-2*	NS	NS	NS
220	Gage#29-3	NS	NS	NS
220	Gage#29-3*	NS	NS	NS
218	Gage#30-1	NS	NS	NS
214	Gage#31-1	NS	NS	NS
215	Gage#46-1	NS	NS	NS
253	Gage#51-1	NS	NS	NS
253	Gage#51-1*	NS	NS	NA
216	Gage#56-1	NS	NS	NS
257	Gage#66-1	NS	NS	NS
644	Gage#92-1	NS	NS	NS
644	Gage#92-1*	NS	NS	NA
641	Gage#92-2	2/1/00	ND(4)	ND(0.5)
642	Gage#92-3	NS	NS	NS
3091	Gage#98-1	NS	NS	NS
<b>City of Riverside (Waterman System)</b>				
273	Hunt#6	NS	NS	NA
271	Hunt#10	NS	NS	NA
272	Hunt#11	NS	NS	NA
<b>City of Riverside Water System Sampling Points</b>				
2946	Iowa Booster (Waterman)	2/1/00	ND(4)	ND(0.5)
2947	Gage Delivery (Gage)	2/1/00	ND(4)	ND(0.5)
2948	7th & Chicago (Reservoir)	2/1/00	ND(4)	ND(0.5)
3018	Gage Arlington	NS	NS	NA
<b>City of Redlands</b>				
542	COR Church St <sup>a</sup>	NS	NS	NA
2673	COR#38 <sup>a</sup>	NS	NS	NA
535	COR Mentone Acres <sup>a</sup>	NS	NS	NA
29	COR Orange St <sup>a</sup>	NS	NS	NA
74	COR Rees	NS	NS	NS

**Notes:**

- \* = Twice-monthly sampling result
- \*\* = Confirmation sampling results
- ND(4) = Not detected at the specified limit
- MUN = Duplicate sample collected from the well listed directly above
- NA = Not Analyzed
- NS = Not Sampled

- TCE = Trichloroethene
- Perchlorate analyzed using DHS Method (EPA 300.0 Modified)
- TCE analyzed using EPA Method 502.2
- <sup>a</sup> = Well sampled on quarterly basis, if active
- <sup>b</sup> = Gage 26-1 and Gage 27-1 are currently being treated for TCE
- <sup>c</sup> = Water purged to waste and not into system
- <sup>d</sup> = Concentration in well is a result of cross flow between hydrostratigraphic units

TABLE 5

**SUMMARY OF WATER LEVEL MEASUREMENTS  
FEBRUARY 2000 SAMPLING EVENT**

HSI#	Well Name	Measure Date	Depth to Water	Measuring Point Elevation	Groundwater Elevation	Comments
<b>CITY OF LOMA LINDA</b>						
692	Mountain View #2	01/31/00	143	1085	942	Static
3106	Mountain View #3	01/31/00	110	1086	976	Pumping
693	Richardson #1	01/31/00	121	1077	956	Static
694	Richardson #2	01/31/00	134	1078	944	Static
707	Richardson #3	01/31/00	185	1085	900	Pumping
<b>Southern California Edison</b>						
554	SCE#2(AUX)	NM	NM	1100.00	NM	Pumping
<b>Loma Linda University</b>						
267	LLUniv Anderson #2	NM	NM	1075	NM	Pumping
717	LLUniv Anderson #3	NM	NM	1070	NM	Pumping
<b>City of Riverside (Gage System)</b>						
252	Gage#26-1	02/01/00	86.20	1045.33	959.13	Pumping
258	Gage#27-1	02/01/00	84.90	1044.64	959.74	Pumping
259	Gage#27-2	02/01/00	69.80	1044.64	974.84	Static
260	Gage#29-1	02/01/00	70.90	1044.43	973.53	Static
219	Gage#29-2	02/01/00	63.90	1046.31	982.41	Static
220	Gage#29-3	02/01/00	69.00	1048.75	979.75	Static
218	Gage#30-1	02/01/00	87.10	1054.17	967.07	Static
214	Gage#31-1	02/01/00	68.10	1054.64	986.54	Static
215	Gage#46-1	02/01/00	73.30	1065.50	992.20	Static
253	Gage#51-1	02/01/00	75.30	1044.64	969.34	Static
216	Gage#56-1	02/01/00	114.70	1065.50	950.80	Static
257	Gage#66-1	02/01/00	76.80	1044.85	968.05	Static
644	Gage#92-1	02/01/00	100.90	1047.78	946.88	Static
641	Gage#92-2	02/01/00	155.00	1053.38	898.38	Pumping
642	Gage#92-3	02/01/00	159.70	1058.78	899.08	Pumping
3091	Gage#98-1	02/01/00	153.90	1058.78	904.88	Pumping
<b>City of Riverside (Waterman System)</b>						
273	Hunt#6	NM	NM	1015.5	NM	Pumping
271	Hunt#10	NM	NM	1017	NM	Pumping
272	Hunt#11	NM	NM	1015.7	NM	Pumping
<b>City of Redlands</b>						
542	COR Church St	Feb-00	147	1344.8	1197.8	Static
2673	COR#38	Feb-00	67	NA	NA	Static
535	COR Mentone Acres	Feb-00	239	1506.4	1267.4	Static
29	COR Orange st	Feb-00	110	1282	1172.0	Static
74	COR Rees	Feb-00	214	1490	1276.0	Static

**Notes:**

All measurements reported in feet below measuring point (ft-bmp)

Water level measurements for all City of Loma Linda, City of Riverside, and City of Redlands wells were obtained by purveyor personnel.

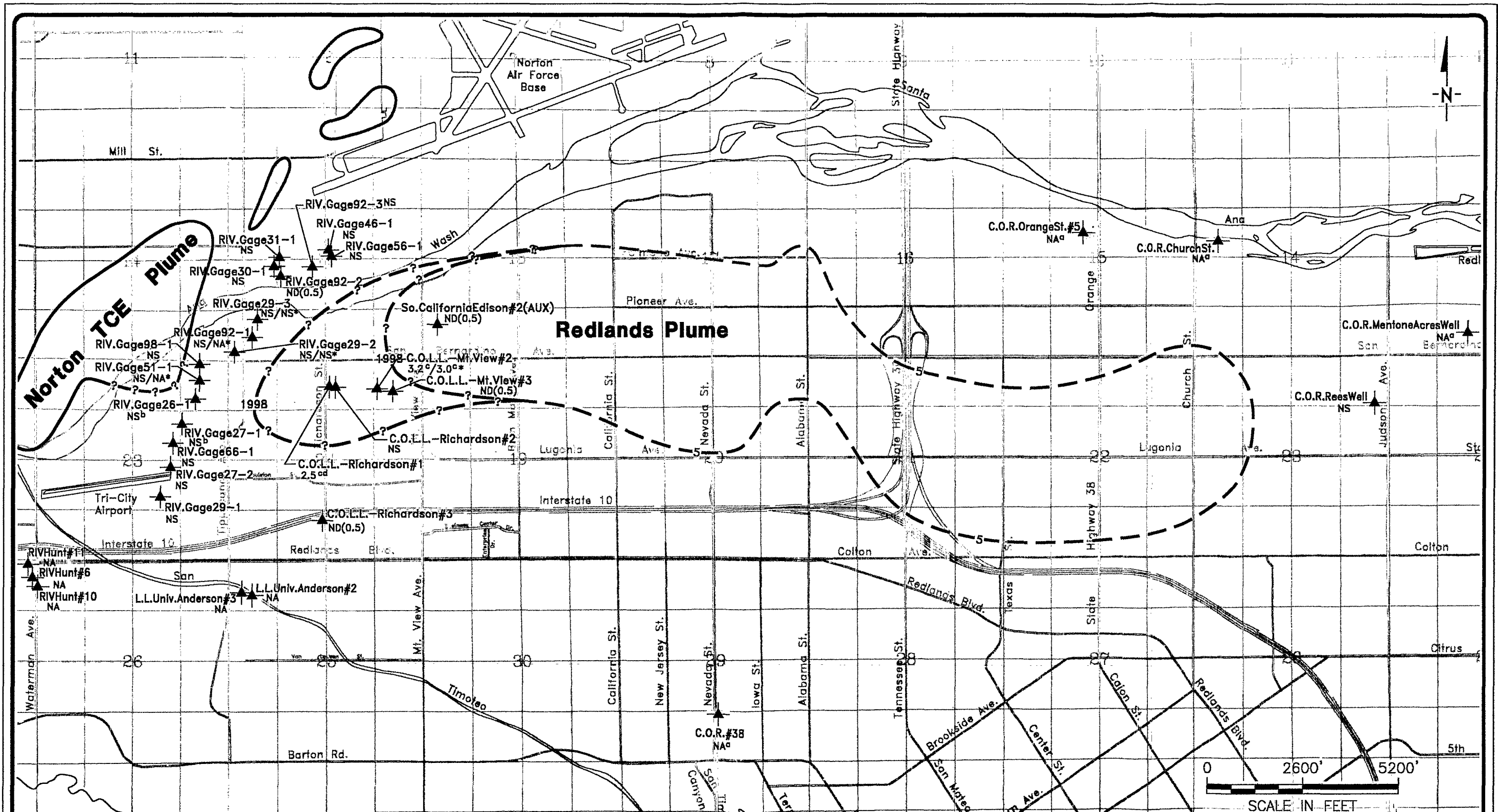
Elevations given in feet above mean sea level (ft-msl)

NM=Not measured

NA=Data not available

Static water levels were allowed to recover a minimum of 30 minutes to obtain a static water level measurement

**FIGURES**



# EXPLANATION

- ▲ Wells Currently Sampled Under the Existing WSCP Sampling Program
- 3.2° TCE Results (µg/L)
  - a Quarterly Sampling Results
  - b Well Currently Being Treated for TCE
  - c Water Purged to Waste and not Into System

- 5 --- Approximate TCE Plume Location 5 µg/L (1998 Interpretation of Redlands Plume)
- 5 --- Approximate TCE Plume Location 5 µg/L (Earth Tech June 1999 Interpretation of Norton AFB Plume)
- 1998 --- Project 5 µg/L TCE Contour in Hydrostratigraphic Unit 2
- 1998 --- Project 5 µg/L TCE Contour in Hydrostratigraphic Unit 4

- ND(0.5) Not Detected at Indicated Detection Limit
- NS Not Sampled
- NA Not Analyzed
- \* Twice-Monthly Sampling Results
- d Concentration in Well is a Result of Cross Flow Between Hydrostratigraphic Units

- ND(0.5) C.O.L.L. Mountain View Blend at Lawton
- NS C.O.L.L. Richardson Blend
- ND(0.5) Riv. Iowa Booster (Waterman)
- ND(0.5) Riv. Gage Delivery (Gage)
- ND(0.5) Riv. 7th + Chicago (Reservoir)
- NA Gage Arlington

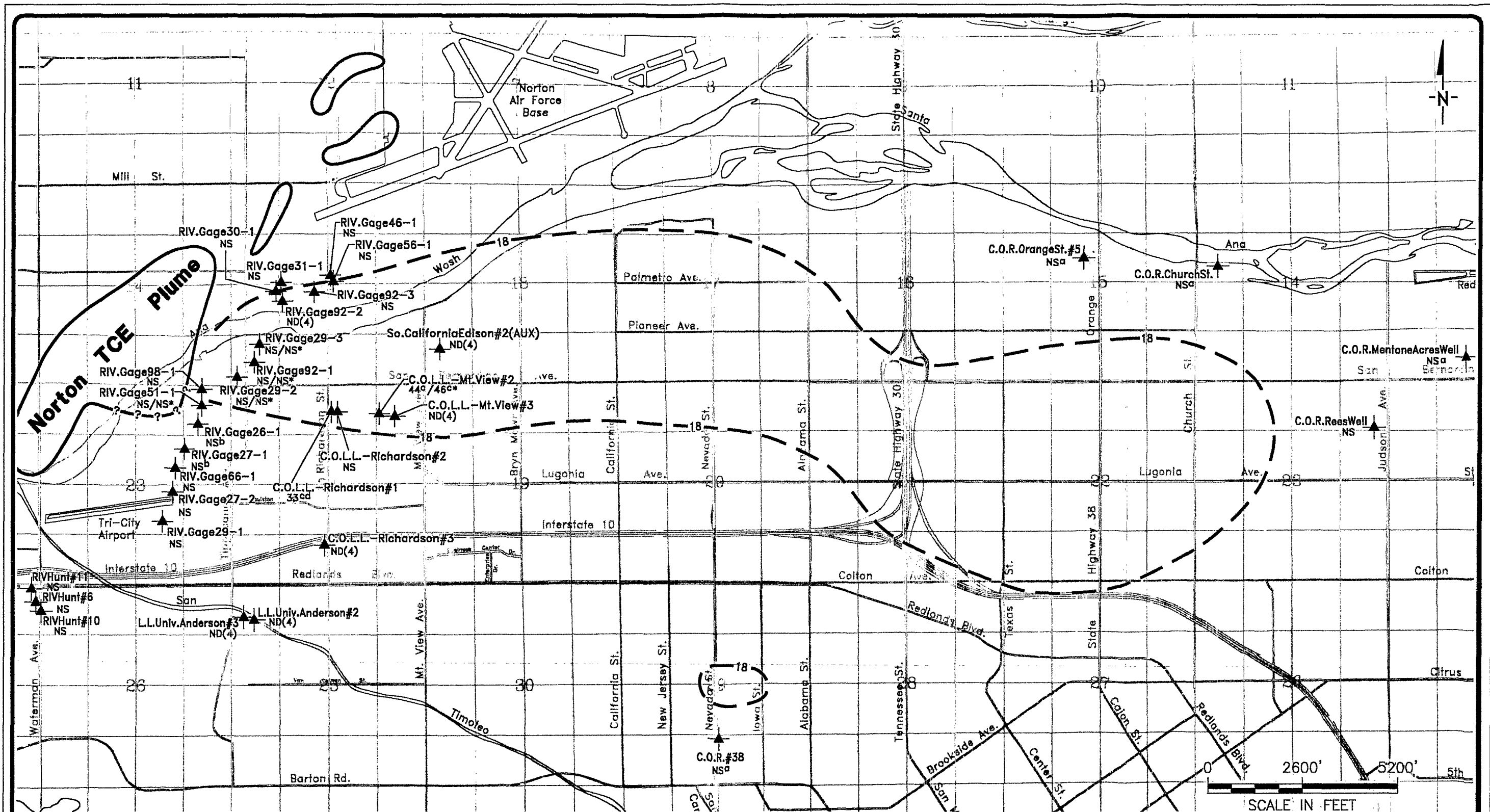
TITLE: WSCP Production Well Sampling Program  
TCE Data Results February 2000

LOCATION: LOCKHEED MARTIN  
REDLANDS, CALIFORNIA

HSI  
GEOTRANS  
A TETRA TECH COMPANY

CHECKED: Tom Titus  
DRAFTED: Hector Magaña  
PROJ.: C541-101  
DATE: 03/07/00

FIGURE:  
1



# EXPLANATION

- ▲ Wells Currently Sampled Under the Existing WSCP Sampling Program
- 18- Approximate 18 µg/L Perchlorate Plume Location (1998 Interpretation)
- 5- Approximate TCE Plume Location 5 µg/L (Earth Tech June 1999 Interpretation of Norton AFB Plume)
- \* Twice-Monthly Sampling Results

Mc\redlands\view-graphs\71w188-b.dwg

- 46<sup>a</sup> Perchlorate (µg/L) Results
- ND(4) Not Detected at Indicated Detection Limit
- NS Not Sampled
- a Quarterly Sampling Results
- b Well Currently Being Treated for TCE
- c Water Purged to Waste and not Into System
- d Concentration in Well is a Result of Cross Flow Between Hydrostratigraphic Units

- ND(4) C.O.L.L. Mountain View Blend - Lawton
- NS C.O.L.L. Richardson Blend
- ND(4) Riv. Iowa Booster (Waterman)
- ND(4) Riv. Gage Delivery (Gage)
- ND(4) Riv. 7th + Chicago (Reservoir)
- NS Gage Arlington

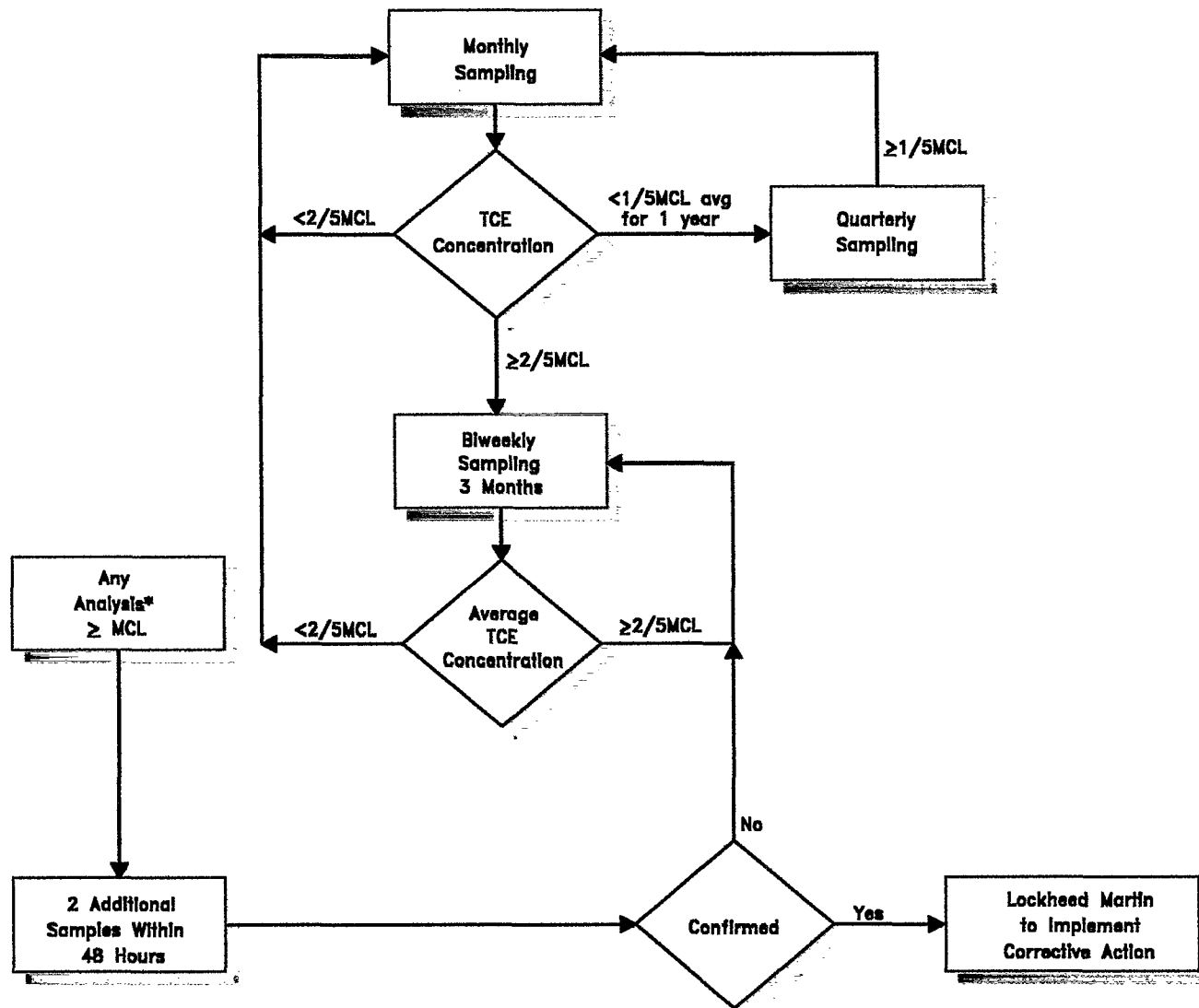
TITLE: WSCP Production Well Sampling Program  
Perchlorate Data Results February 2000

LOCATION: LOCKHEED MARTIN  
REDLANDS, CALIFORNIA

HSI  
GEOTRANS  
A TETRA TECH COMPANY

CHECKED: Tom Titus  
DRAFTED: Hector Magaña  
PROJ.: C541-101  
DATE: 03/07/00


FIGURE:  
2

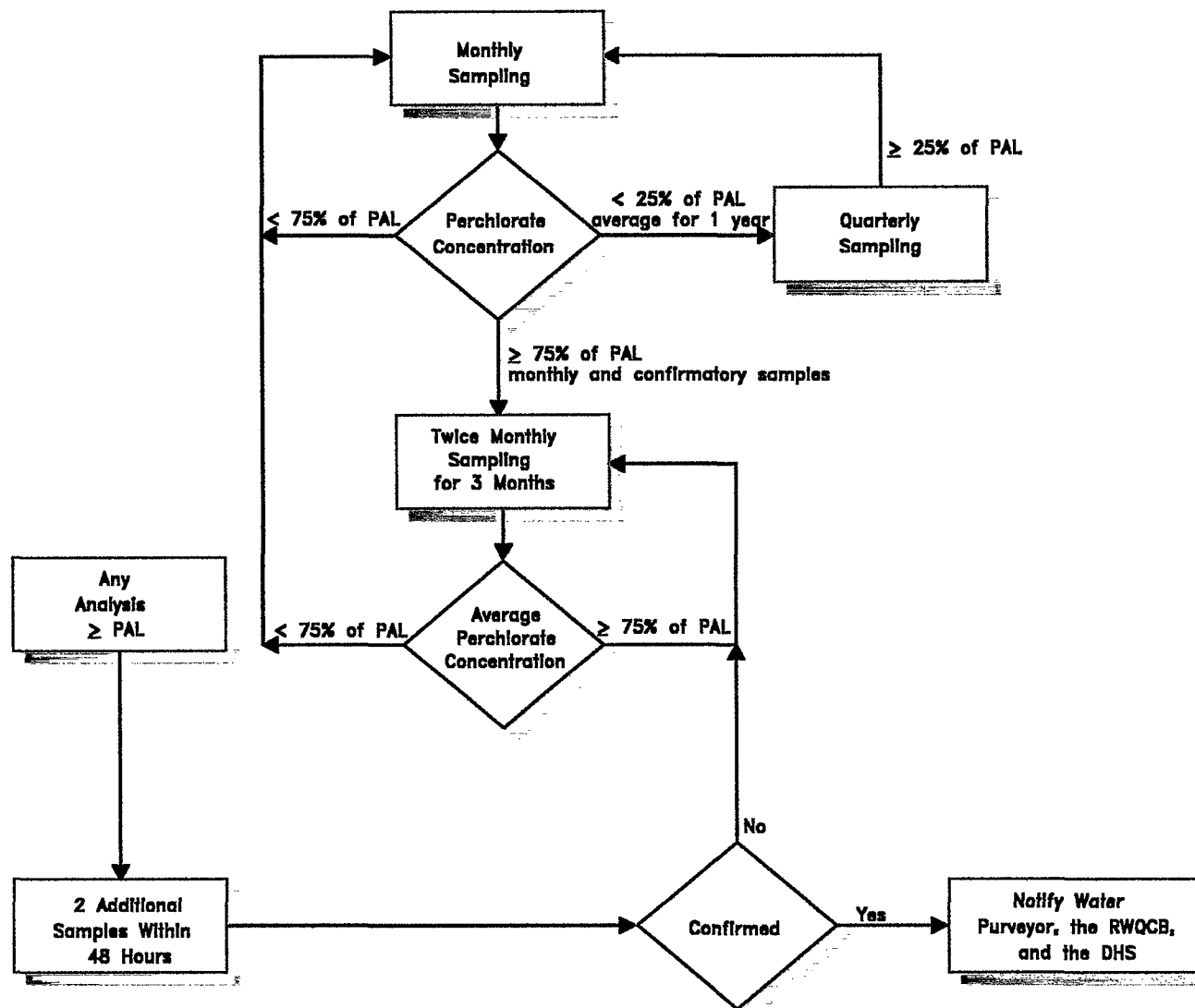


**Footnote:**

\* If, at a specific well, blending is occurring to provide acceptable water for compounds other than TCE, then no corrective action may be necessary as long as the concentration of TCE is less than 5.0 µg/L in the finished water.


TCE MCL = 5 µg/L (California Regulations, Title 22, Division 4, Chapter 15, Section 64444)

TITLE: Decision Matrix for Sampling of Production Wells for TCE from the Crafton-Redlands Plume		
LOCATION: LOCKHEED MARTIN REDLANDS, CALIFORNIA		
 <b>HSI GEOTRANS</b> A TETRA TECH COMPANY	CHECKED: Ron Bruns	FIGURE:  <b>3</b>
	DRAFTED: Hector Magaña	
	PROJ.: C541-101	
	DATE: 09/25/98	



**Footnote:**

Perchlorate Provisional Action Level (PAL) = 18 µg/L (California Department of Health Services, May 1997)

TITLE: Decision Matrix for Sampling Production Wells for Perchlorate		
LOCATION: LOCKHEED MARTIN REDLANDS, CALIFORNIA		
 <b>HSI GEOTRANS</b> A TETRA TECH COMPANY	CHECKED: Ron Bruns	FIGURE:  <b>4</b>
	DRAFTED: Hector Magaña	
	PROJ.: C541-101	
	DATE: 09/25/98	

**ATTACHMENT A**  
**GEOLIS FIELD FORMS**

**ATTACHMENT A**

**GEOLIS FIELD FORMS**  
**(Available Upon Request)**

**ATTACHMENT B**

**CHAIN-OF-CUSTODY RECORDS AND  
LABORATORY DATA SHEETS  
QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION**

**ATTACHMENT B**

**CHAIN-OF-CUSTODY RECORDS AND  
LABORATORY DATA SHEETS AND LEVEL III MODIFIED  
QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION  
(Available Upon Request)**